

Development and Psychometric Evaluation of Beneficiary Knowledge Indices from the Medicare Current Beneficiary Survey

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Executive Summary

The Balanced Budget Act (BBA) of 1997 significantly increased the number and range of health plan options potentially available to Medicare beneficiaries. To inform Medicare beneficiaries about these choices, the law provided for specific information dissemination activities that the Centers for Medicare & Medicaid Services (CMS) implemented with the National Medicare Education Program (NMEP). The NMEP is the largest and most comprehensive information program ever undertaken by the Medicare program. One important feature of the NMEP is the *Medicare & You* handbook which was first nationally distributed in 1999.

A goal of RTI's project, *Analysis of Medicare Beneficiary Knowledge Data Using the Medicare Current Beneficiary Survey (MCBS): Phase Three*, is to evaluate the impact of the NMEP on beneficiaries' knowledge of the Medicare program. As a part of this project, RTI is comparing knowledge before and after the first national distribution of the *Medicare & You* handbook using data from the 1999 and 2000 administrations of the Medicare Current Beneficiary Survey (MCBS). To assess beneficiary knowledge, we developed three potential knowledge measures using data from the Beneficiary Knowledge (BK rounds 23 & 26) and Beneficiary Needs (BN rounds 24 & 27) supplemental rounds of the CY 1998 and 1999 Medicare Current Beneficiary Survey (MCBS) Access to Care files. The first measure, the perceived knowledge index, includes five questions that ask beneficiaries to subjectively rate how much they know about a particular topic related to Medicare. The other two measures are a three-item and a seven-item quiz that require participants to respond to a series of true/false questions.

We evaluated the psychometric properties of the knowledge measures by conducting item-level analyses and scale-level descriptive statistics, assessing internal consistency reliability, and establishing construct validity. The item-level analyses of the perceived knowledge items suggest that these items appropriately do not exhibit floor or ceiling effects. Comparisons of the 3-item and 7-item quiz scores according to beneficiaries' educational achievement suggest that the difficulty levels of both of these quizzes are equivalent to a high school level. The reliability analyses indicate that both the perceived knowledge index and the 7-item quiz reached acceptable levels of internal consistency reliability while the 3-item quiz did not meet the criterion for acceptable reliability.

We used three different approaches to assess construct validity of the knowledge indices. First, we evaluated the relationship between the knowledge indices and a global knowledge item that asks beneficiaries to rate how much they know about the Medicare program. A strong relationship between a knowledge index and the global knowledge item would provide support for the construct validity of the index. Second, we compared the mean knowledge index scores for groups previously shown to differ in knowledge. Finally, we compared the mean knowledge scores for groups that we hypothesized would have different levels of knowledge.

Based solely on the quantitative results, the perceived knowledge index seems to have the best psychometric properties. This index had the highest Cronbach's alpha, demonstrated a strong, monotonic relationship with the global knowledge question, and showed significant differences in index scores between respondents who were expected to have different knowledge levels. However, other criteria, such as the content of the items, must be considered when selecting the most appropriate knowledge measure. The perceived knowledge index relies on beneficiaries to be the sole judge of their knowledge. Individuals' subjective ratings may be influenced by factors other than their knowledge, such as confidence in decision-making or satisfaction with information received. Therefore, the perceived knowledge index may not provide the most accurate assessment of actual knowledge level. A more precise measure of knowledge would require respondents to demonstrate their knowledge, such as by correctly answering the true/false questions included on the three-item and seven-item quizzes.

On the basis of both content considerations and the psychometric analysis results, the seven-item quiz appears to be the most useful measure of beneficiary knowledge overall. As mentioned above, the quiz requires beneficiaries to demonstrate their knowledge rather than merely stating that they know everything they need to know. In addition, the quiz had good variability in scores, reached an acceptable level of internal consistency reliability, and performed well on the validity analyses.

Possible modifications to the seven-item quiz depend on the intended use of the measure. If the goal of the quiz is to obtain the most precise estimate of beneficiaries' knowledge possible, then the quiz should contain questions that cover all difficulty levels. The grade-level analyses suggest that the items on the seven-item quiz cover all education levels except for no formal education. Very few respondents report having no formal education and therefore it may not be necessary to add questions specifically targeted at this group. However, the quiz contains only one item at the high school graduate level. Because more respondents report being a high school graduate than any other educational level, it may be helpful to add more items targeted at this group.

In contrast, if the purpose of the quiz is to determine whether Medicare beneficiaries reach a certain proficiency level, then the primary emphasis should be on the content of the quiz items. The items should cover the entire range of information that beneficiaries need to know in order to make informed decisions. Less emphasis should be placed on the difficulty of the items. In this case, a limitation of the seven-item quiz is that four of its seven questions deal with managed care plans which restricts the range of knowledge that the quiz can measure. Other questions could be added to improve the comprehensiveness of the quiz. In fact, as part of RTI's *Questionnaire Development and Cognitive Testing Using Item Response Theory* project, several new knowledge questions were developed that address a variety of issues, including beneficiary rights and health plan decision-making (Uhrig et al., 2001), and could be used to expand the seven-item quiz.

1.0 Introduction

The Balanced Budget Act (BBA) of 1997 significantly increased the number and range of health plan options potentially available to Medicare beneficiaries. To inform Medicare beneficiaries about these choices, the law provided for specific information dissemination activities that the Centers for Medicare & Medicaid Services implemented with the National Medicare Education Program (NMEP). The NMEP is the largest and most comprehensive information program ever undertaken by the Medicare program. Some important features of the NMEP include the *Medicare & You* handbook, the Medicare website (www.medicare.gov), and the helpline (1-800-MEDICARE).

A goal of RTI's project, *Analysis of Medicare Beneficiary Knowledge Data Using the Medicare Current Beneficiary Survey (MCBS): Phase Three*, is to evaluate the impact of the NMEP on beneficiaries' knowledge of the Medicare program and available health plan options. The Medicare Current Beneficiary Survey (MCBS) provides a useful source of data with which to assess levels of Medicare beneficiary program knowledge. In the MCBS, a large national probability sample of 14,000 or more Medicare beneficiaries are interviewed in to a rotating panel design every four months for up to four years. Each year, approximately one quarter of the sample is rotated out of the survey and replaced with new sample members. Therefore, 25 percent of each annual MCBS data set represents a cross section of the Medicare population enrolled in the program continuously since January 1st of that year and 75 percent represents a longitudinal beneficiary panel.

As a part of the NMEP, the *Medicare & You* (2000) handbook was first distributed nationally in the fall of 1999. To evaluate the impact of the handbook, the Phase 3 project assesses changes in beneficiary knowledge from immediately before to immediately after national distribution of the handbook. A first step in determining the level of Medicare program knowledge among Medicare beneficiaries is to develop an index to measure knowledge of the Medicare program. As a part of Phases 1 and 2 of this project, knowledge indices were developed using data from the CY 1995 to 1998 Access to Care MCBS files (Bann et al., 2000). This report expands on this previous work by developing knowledge measures from questions included in the Beneficiary Knowledge (BK) supplemental rounds 23 & 26 and Beneficiary Needs (BN) supplemental rounds 24 and 27 of the 1998 and 1999 Access to care files MCBS respectively, which were administered immediately before and after national distribution of the first *Medicare & You* (2000) handbook¹. In addition, this report evaluates the psychometric properties of each knowledge measure, including internal consistency reliability and construct validity.

¹ The 1998 and 1999 BK supplements (Rounds 23 & 26) were administered from January to April of 1999 and 2000, respectively, while the 1998 and 1999 BN (supplemental rounds 24 & 27) were administered from May to August of 1999 and 2000, respectively.

2.0 Development of Knowledge Measures

We developed three different knowledge measures using questions from the CY 1998 and 1999 Access to Care files and related supplemental rounds of the MCBS. The knowledge measures and the items comprising them are listed in Table A-1 in the appendix. The first knowledge measure, the perceived knowledge index, includes five items that were administered during BN Rounds 24 and 27¹. These questions ask beneficiaries how much they feel they know about five topics: (a) what services Medicare covers, (b) how much they have to pay for medical services covered by Medicare, (c) supplemental or Medigap insurance, (d) the availability and benefits of Medicare HMOs, and (e) choosing or finding a doctor or other health care provider.

The other two measures are quizzes requiring beneficiaries to determine whether statements are true or false. The three-item quiz, which was administered during BN Rounds 24 and 27, includes true/false questions about whether Medicare covers colorectal cancer screening, whether it pays for flu shots, and whether supplemental insurance is the same as a Medicare managed care plan. The seven-item quiz, administered in BK Rounds 23 and 26, includes questions about Medicare options and Medicare managed care plans. The quiz contained eight items in 1998²; however, one of these items was dropped from the 1999 MCBS. To allow for comparisons across 1998 and 1999, only the seven items included in both years were used to compute the quiz scores in this report.

2.1 Scoring Algorithms

2.1.1 Perceived Knowledge Index

The perceived knowledge index was created by reverse scoring each of the five response categories across the items. For example, in the original coding of the variables, knowing “just about everything you need to know...” was coded as “1,” and knowing “almost none of what you need to know...” was coded as “5.” The former response was recoded as “5,” while the latter was recoded as “1.” Responses for “2” and “4” were also switched. “Don’t know” and “Refused” responses were recoded as missing. Then the recoded responses for all five questions were summed to compute the overall perceived knowledge index score.

For example, if a respondent answered “3,” “4,” “2,” “1,” and “5,” respectively, to the original questions, the questions would be reverse coded and the knowledge score would be calculated as follows:

$$3 + 2 + 4 + 5 + 1 = 15.$$

¹ The perceived knowledge index was referred to as the “know-all-need-to-know index” in Bann et al. (2000).

² A psychometric evaluation of the eight-item quiz is included in Bann et al. (2000).

Higher scores on this index reflect beneficiaries reporting that they knew more of what they needed to know about the five different topics. Scores produced by this system may range from 5 to 25, thus providing greater variability in scores and more power to discriminate among beneficiaries than would be obtained with only true/false (two response) questions.

We excluded some potential survey questions from the index. One item regarding the Medicaid program was not included because it was asked of Medicaid recipients only. Another item that asks whether respondents know what they need to know to stay healthy was excluded from the calculation of the scale because the question does not address an insurance benefit or option and therefore appeared conceptually unrelated to the other five items.

We calculated the perceived knowledge index by imputing values for missing data rather than eliminating a respondent's answers. The mean of the remaining items was substituted for the missing item values (Chapman, 1976). Imputation was used only for respondents who answered at least half of the items (three of the five items). Individuals missing responses to more than half of the items were assigned a value of missing for the index.

2.1.1 Three-Item Quiz

Correct responses to each of the three quiz questions were coded as "1," while incorrect or "don't know" responses were coded as "0." One potential quiz item concerning Medicare coverage of mammograms was excluded from the overall score calculation because it was asked only of women. The recorded responses were then summed to create the quiz scores. For example, a respondent who had only one correct response and two incorrect responses received a score of "1," as shown:

$$0 + 1 + 0 = 1.$$

An advantage of this scoring method is that it yields scores with meaningful interpretations, specifically, the number of questions to which the respondent knew the correct answer. Scores range from "0" to "3," with higher scores indicating greater knowledge of the Medicare program.

For both this quiz and the seven-item quiz described below, respondents who refused or were missing data on all of the quiz items were coded as missing for the overall quiz score. In this sample, all of the remaining respondents provided answers to all of the quiz questions or gave a response of "don't know." As mentioned earlier, "don't know" responses were coded as incorrect. Therefore, in contrast to the perceived knowledge index, we did not need to impute missing values in order to calculate scores for the three-item quiz or the seven-item quiz.

2.1.3 Seven-Item Quiz

The score for the seven-item quiz was created using a scoring method similar to that of the three-item quiz. Correct responses were given a score of “1,” and incorrect and “don’t know” responses were coded as “0.” The recoded items were then summed to create an overall quiz score. For example, the score for a respondent who answered the first four items correctly and the last three incorrectly would be calculated as follows:

$$1 + 1 + 1 + 1 + 0 + 0 + 0 = 4.$$

This respondent would receive a quiz score of “4,” indicating that four of the seven questions were answered correctly. With this scoring system, quiz scores can range from “0” to “7,” with higher scores indicating greater levels of knowledge.

3.0 Psychometric Analysis Methods

To evaluate the psychometric properties of the knowledge measures, we conducted item-level and scale-level analyses. The item-level analyses examined the psychometric properties of each individual item included in the scale, while the scale-level analyses evaluated the scale as a whole.

3.1 Item-Level Analyses

For all three knowledge indices, we computed the correlations between each item on the index and the total index score. Item-total score correlations provide information about the contribution of the item to the reliability of the scale. Ideally, items should have item-total correlations of at least 0.30. Because the item itself is included in the calculation of the index score, the item-total score correlations may be inflated. To avoid possible inflation, the item-total score correlations in this report were corrected for overlap (Howard and Forehand, 1962).

For the perceived knowledge items, we examined the distribution of responses for possible floor or ceiling effects (i.e., scale compression). Ideally, the item should have variability in responses, indicating that participants are utilizing all five response options. For the true/false quiz questions, we examined the percentage of correct responses which provides an indicator of the difficulty of the questions. In addition, we utilized information on beneficiaries' highest school grade completed to try to match the difficulty level of an item to a grade level. If possible, a knowledge index should contain items with a wide range of difficulty levels to enable it to discriminate among respondents with a variety of knowledge levels.

3.2 Scale-Level Analyses

This section describes the analyses used to assess the psychometric properties of the knowledge indices. For each scale, three sets of analyses were computed: (1) descriptive statistics, (2) reliability analyses, and (3) validity analyses.

3.2.1 Descriptive Statistics

For each scale, we calculated descriptive statistics to determine the most representative scale scores and to examine the distribution of scores. A lack of variability of scores can compromise the validity of scale scores. We report the mean, median, mode, and standard deviation for both the perceived knowledge index and the 7-item quiz. We report the frequency of scores for the three-item quiz because it has only four possible total quiz scores.

3.2.2 Reliability

The internal consistency reliability of the scales was estimated using Cronbach's alpha coefficient (Cronbach, 1951). Internal consistency measures the degree to which items on a scale are related to each other and therefore appear to be measuring the same construct. One common rule of thumb is to require alpha coefficients to be 0.70 and above in order for the index score to be considered reliable for use in group-level statistical analyses (Guilford, 1956; Nunally, 1978). The coefficient alphas for each index were also calculated separately for several subgroups defined by insurance and service utilization variables. These analyses helped determine whether the reliability of the index remained consistent across different groups.

Test-retest reliability was not assessed because this type of reliability is used to measure the stability of a scale over time and is usually assessed over a short period. The time between the administration of each wave of the knowledge supplement MCBS is relatively long (i.e., one year) during which time several factors (e.g., experience with the program, use of services) could affect a respondent's level of knowledge. Calculating the test-retest reliability using assessments administered so far apart would greatly underestimate the reliability of the scales. Therefore, test-retest reliability is not an appropriate type of reliability assessment for these knowledge measures.

3.2.3 Validity

Several different approaches may be used to establish the validity of a new scale. Ideally, the new scale would be shown to be highly related to a well-established and validated scale measuring the same construct, often called a "gold standard." Unfortunately, a gold standard for measuring Medicare beneficiary knowledge does not exist. Therefore, we assessed validity using three alternative approaches. These methods may not individually provide evidence as strong as that of a comparison with a gold standard, but together they may provide at least preliminary evidence to support the validity of the knowledge indices.

For the first set of validity analyses, we examined the relationship between the knowledge indices and another measure of the same construct. If the indices are highly related to the other knowledge measure, they will have demonstrated evidence of construct validity. The MCBS includes a knowledge question that asks respondents how much they feel they know about the Medicare program; the question is followed by a 5-point rating scale ranging from "almost none of what you need to know" to "just about everything you need to know." Bann and colleagues (2000) refer to this question as the "global know-all-need-to-know (KANTK) question." This question obtains the respondents' own perceptions of their Medicare-related knowledge and would be expected to be related to the level of knowledge indicated by their scores on the knowledge indices. A strong monotonic relationship between this question and the knowledge indices would support the validity of the indices.

Next we conducted analyses to determine if the knowledge scale scores discriminated among groups of Medicare beneficiaries who have previously been shown to differ in their knowledge of Medicare. This approach is sometimes referred to as known-groups comparisons. We based our expectations of differing levels of knowledge among beneficiaries on previous research. For example, factors related to socioeconomic status are often predictive of levels of insurance knowledge. Several

studies report that respondents with more education have higher levels of insurance knowledge (Lambert, 1980; Marquis, 1983; McCall, Rice, and Sangl, 1986; Hibbard et al., 1998; McCormack et al., 2002). Higher knowledge levels have also been associated with higher incomes (Lambert, 1980; Marquis, 1983; McCall, Rice, and Sangl, 1986; Hibbard et al., 1998) and having a supplemental insurance plan (Cafferata, 1984). Other researchers have found that, among older adults, those who are younger have more insurance-related knowledge (Lambert, 1980; Cafferata, 1984).

Based on this research, we expected that the following groups of beneficiaries would have higher levels of knowledge about the Medicare program: (1) beneficiaries with more education, (2) beneficiaries with higher incomes, and (3) beneficiaries with supplemental insurance. We also expected that among beneficiaries who are eligible for Medicare because of their age, those who are younger would have more knowledge. In this report, evidence for construct validity of a particular scale is provided if the results of the analyses on that scale showed these expected patterns.

Finally, we compared groups of respondents that we hypothesized would differ in knowledge. For this report, we called these exploratory comparisons. We expected that beneficiaries enrolled in managed care during the past year would have more knowledge than those not enrolled in managed care during the past year because they are required to make more choices regarding their insurance arrangements than beneficiaries using fee-for-service. Because four of the items on the seven-item quiz address issues involving managed care, we expected the greatest effect to be present for this measure.

In addition, we hypothesized that beneficiaries who have more experience with the Medicare program would have higher levels of knowledge. For these validity analyses, we used level of service utilization as an approximation of experience with the Medicare program. Two types of service utilization during the past year were included: (1) institutional utilization and (2) Part B utilization. The amounts of allowable and reimbursed charges were also used as indicators of experience with the Medicare system.

Some prior research supports this hypothesis. Cafferata (1984) found that among a subsample of older adults with private insurance, service utilization was positively associated with knowledge. McCormack and colleagues (2002) found that hospitalization and number of doctor visits were positively related to beneficiary knowledge of the Medicare system. Results from the national *Medicare & You* evaluation also suggest a positive relationship between beneficiary knowledge and number of doctor visits (McCormack et al., 2001).

The following background and experience variables were used for both the known-groups comparisons and the exploratory comparisons:

- income (under \$25,000 or \$25,000 or more),
- age (65 to 75 years old, or over 75 years old),
- educational achievement (8th grade or less, more than 8th grade but no college, or college),
- enrollment in managed care during the past year (enrolled or not enrolled),

- private supplemental insurance (have supplemental insurance or do not have supplemental insurance),
- institutional utilization (some utilization or no utilization),
- Part B utilization (some utilization or no utilization),
- total covered charges (\$0; \$1 to \$499; \$500 to \$4,999; or \$5,000 or more),
- total reimbursed dollars (\$0; \$1 to \$499; \$500 to \$4,999; or \$5,000 or more),
- covered institutional charges (\$0; \$1 to \$499; \$500 to \$4,999; or \$5,000 or more), and
- Part B charges (\$0; \$1 to \$499; \$500 to \$1,499; or \$1,500 or more).

Because complete information on service utilization was available only for respondents who were not enrolled in an HMO, our analyses of these variables included only individuals who were not enrolled in managed care during the year before the survey data were collected.

4.0 Results

This section describes the results of the psychometric analyses of the three knowledge indices: the perceived knowledge index, the three-item quiz, and the seven-item quiz. For each index, both item-level and scale-level analyses were computed. As a part of the scale-level analyses, the reliability and construct validity of the indices were evaluated.

Data from the CY 1998 and 1999 Access to Care Beneficiary Knowledge (BK rounds 23 & 26) and Beneficiary Needs (BN rounds 24 & 27) supplemental rounds of the MCBS were used for the psychometric analyses. During 1998, the knowledge questions were administered to all respondents, however, in 1999 the questions comprising the three-item quiz and the seven-item quiz were only administered to respondents who were in their first year of participation in the MCBS. Therefore, a much smaller number of respondents was available for the 1999 analyses of these indices.

Only participants who were living in the community, rather than an institution, were included in the psychometric analyses. In addition, because this was an elderly population whose members were likely to experience disabilities, the use of a proxy was sometimes necessary to obtain information on a respondent.¹ Therefore, for completeness, proxy information was included in these analyses. However, for each of these comparisons, data for sample members and proxy respondents were analyzed separately. It was expected that proxy and sample member participants would respond to the knowledge indices differently.

4.1 Perceived Knowledge Index

4.1.1 Item-Level Analyses

Each item in the perceived knowledge index contains these five response options: (1) “Almost none of what you need to know,” (2) “A little of what you need to know,” (3) “Some of what you need to know,” (4) “Most of what you need to know,” and (5) “Just about everything you need to know.” Because these items had more than two response options, we examined the distribution of responses for any possible floor or ceiling effects. A floor effect would be present if respondents tended to select only the lowest response options, while a ceiling effect would occur if respondents selected only the highest response options. The presence of either of these effects would restrict the possible range of scores and thereby limit the ability of the index scores to discriminate among respondents with different levels of knowledge.

¹ In both 1998 and 1999, proxy interviews comprised 10% of the interviews conducted.

Table 1 presents the response distributions of the perceived knowledge questions for the sample members in 1998 and 1999 while Table 2 presents the response distributions for proxy respondents. Overall, the perceived knowledge items demonstrated good variability across responses, suggesting that there are no floor or ceiling effects for any of the items.

Table 1. Response Distribution of the Perceived Knowledge Questions among Sample Members

Sample Members – 1998					
Question	Almost None	A little	Some	Most	Just about everything
Services Medicare covers	13%	17%	28%	29%	13%
Paying for medical services	13%	16%	24%	29%	18%
Supplemental insurance	26%	16%	20%	23%	15%
Medicare HMOs	41%	17%	16%	15%	11%
Choosing a doctor	8%	11%	20%	34%	28%
Sample Members – 1999					
Question	Almost None	A little	Some	Most	Just about everything
Services Medicare covers	11%	16%	27%	31%	16%
Paying for medical services	11%	15%	24%	31%	20%
Supplemental insurance	25%	15%	19%	25%	16%
Medicare HMOs	41%	15%	15%	15%	13%
Choosing a doctor	7%	9%	19%	34%	30%

SOURCE: Centers for Medicare & Medicaid Services, Medicare Current Beneficiary Survey 1998 and 1999 Access to Care and Supplemental Files BN 24 & 27.

Table 2. Response Distribution of the Perceived Knowledge Questions among Proxy Respondents

Proxy Respondents – 1998					
Question	Almost None	A little	Some	Most	Just about everything
Services Medicare covers	15%	18%	31%	24%	12%
Paying for medical services	14%	15%	24%	27%	20%
Supplemental insurance	30%	19%	18%	20%	13%
Medicare HMOs	42%	20%	16%	13%	9%
Choosing a doctor	8%	12%	20%	34%	27%
Proxy Respondents – 1999					
Question	Almost None	A little	Some	Most	Just about everything
Services Medicare covers	16%	15%	28%	27%	14%
Paying for medical services	16%	11%	22%	29%	22%
Supplemental insurance	31%	15%	17%	21%	16%
Medicare HMOs	45%	16%	15%	14%	11%
Choosing a doctor	8%	10%	19%	35%	28%

SOURCE: Centers for Medicare & Medicaid Services, Medicare Current Beneficiary Survey 1998 and 1999 Access to Care and Supplemental Files BN 24 & 27.

Table 3 displays the item–total score correlations for the perceived knowledge items in 1998 and 1999. The correlations are very similar across both years. All of the correlations are 0.5 or greater, suggesting that these items are highly related and appear to be measuring the same construct. The first two items (services Medicare covers and paying for medical services) are the most highly related to the underlying construct with item–total score correlations around 0.7. The item about Medicare HMOs is the least related to the construct with correlations of approximately 0.5; however, it still contributes to the reliability of the index.

Table 3. Item–Total Score Correlations for the Perceived Knowledge Questions

Question	Sample Member Interviews		Proxy Interviews	
	1998	1999	1998	1999
Services Medicare covers	0.71	0.71	0.72	0.74
Paying for medical services	0.69	0.70	0.74	0.72
Supplemental insurance	0.62	0.63	0.70	0.70
Medicare HMOs	0.50	0.50	0.54	0.54
Choosing a doctor	0.56	0.56	0.61	0.62

SOURCE: Centers for Medicare & Medicaid Services, Medicare Current Beneficiary Survey 1998 and 1999 Access to Care and Supplemental Files BN 24 & 27.

4.1.2 Scale-Level Analyses

This section describes the scale-level descriptive statistics and the reliability and validity analyses for the perceived knowledge index.

Descriptive Statistics

The descriptive statistics for the perceived knowledge index are presented in Table 4. For both sample member and proxy respondents, the mean scores on the perceived knowledge index are slightly higher in 1999 than in 1998. The mode for sample members in 1999 is higher than the mean and median, suggesting that the distribution of scores is skewed to the right. In other words, the majority of scores are clustered on the higher end of the scale, suggesting that most respondents received scores higher than 15 (the middle possible score). The distribution of scores for proxy respondents in 1998 is also slightly skewed to the right. The distributions for proxies and sample members in 1999 appear to be fairly normally distributed with similar values for the means, medians, and modes.

Table 4. Descriptive Statistics for the Perceived Knowledge Index

Sample Member Interviews (Survey Year)	N	Mean	S.D.	Median	Mode
1998 (Round 24)	12,524	15.2	5.0	15	15
1999 (Round 27)	12,606	15.6	5.0	16	20
Proxy Interviews (Survey Year)	N	Mean	S.D.	Median	Mode
1998 (Round 24)	1,330	14.9	5.6	15	17
1999 (Round 27)	1,382	15.1	5.3	15	15

Note: The possible range of scores for the perceived knowledge index was from 5 to 25.

Reliability

The value of Cronbach's alpha was 0.82 for sample members in both 1998 and 1999. Similar values for coefficient alpha were obtained for proxy respondents in 1998 ($\alpha = 0.84$) and 1999 ($\alpha = 0.85$). These values indicate that the perceived knowledge index demonstrated strong internal consistency reliability.

Coefficient alphas of the perceived knowledge index were also calculated separately for various subgroups classified according to enrollment in managed care, institutional and Part B utilization, and amounts of allowable and reimbursed charges. For details of these results, please refer to Tables A-2 through A-8 of the appendix. The coefficient alphas of these different groups were very similar. Among sample member respondents, values of alpha ranged from 0.82 to 0.83 in 1998 and from 0.81 to 0.84 in 1999. Proxy respondents had similar values with alphas ranging from 0.81 to 0.87 in 1998 and from 0.82 to 0.87 in 1999.

Validity

Relationship with Global KANTK Question

We assessed the construct validity of the perceived knowledge index with three different approaches. First we evaluated the relationship between the perceived knowledge index and a global knowledge item that asks beneficiaries how much they feel they know about the Medicare program. Analyses of variance (ANOVAs) indicated that perceived knowledge index scores varied significantly across levels of the global KANTK question for sample members in both 1998 ($F(4, 12336) = 762.71$, $p < .0001$) and 1999 ($F(4, 3617) = 250.33$, $p < .0001$). Similar results were found for proxy respondents in 1998 ($F(4, 1323) = 67.82$, $p < .0001$) and 1999 ($F(4, 369) = 17.16$, $p < .0001$). This means the perceived knowledge index scores were related to the KANTK scores other than by chance. To help interpret the results, we computed the means and standard deviations of the perceived knowledge index scores for each of the five response categories included in the global KANTK question. As shown in Table 5, there is a clear, monotonic relationship between the perceived knowledge index scores and the global KANTK question across both years and both types of respondents. Individuals who rated their knowledge higher on the global KANTK question had higher scores on the perceived knowledge index.

Table 5. Means (and Standard Deviations) of Perceived Knowledge Index Scores by Response to Global KANTK Question

Sample Member Interviews					
Survey Year	Almost none	A little	Some	Most	Just about everything
1998 (Round 24)	11.8 (5.0)	13.4 (4.5)	15.3 (4.3)	17.5 (4.2)	18.7 (4.7)
1999 (Round 27)	11.6 (4.8)	13.9 (4.7)	15.6 (4.4)	17.8 (4.0)	18.9 (4.4)
Proxy Interviews					
Survey Year	Almost none	A little	Some	Most	Just about everything
1998 (Round 24)	11.7 (5.2)	13.3 (4.6)	15.0 (4.3)	17.2 (4.3)	18.4 (5.3)
1999 (Round 27)	11.6 (5.0)	14.3 (5.3)	15.2 (5.2)	16.4 (5.2)	20.0 (5.2)

Group Comparisons

For the next set of validity analyses, we compared the perceived knowledge index scores of beneficiaries who have been shown in previous research to have different levels of knowledge; we referred to this set of analyses as known-groups comparisons. As another set of validity analyses, we compared beneficiaries who we hypothesized would have different levels of knowledge which we referred to as exploratory comparisons. In both sets of analyses, the index value validity measures were computed separately for sample member and proxy respondents. T-tests were used to compare the perceived knowledge index scores for sample members and proxy respondents. As hypothesized, sample member respondents had significantly different scores on the perceived knowledge index than proxy respondents both during 1998 ($t(13883)=2.97, p=.003$) and 1999 ($t(1660)=3.35, p<.001$).

ANOVAs and t-tests were used to compare the perceived knowledge index scores of respondents according to the various background and experience variables. For the t-tests, the assumption of equal variance for the two groups was tested using the F' (folded) statistic (Steel & Torrie, 1980). As implemented in SAS, if this test was significant (i.e., the variances for the two groups were not equal), an approximate t statistic was computed, using Satterthwaite's approximation to estimate the degrees of freedom (Satterthwaite, 1946).

The mean perceived knowledge index scores for each of the groups are presented separately according to interview type in Tables A-9 and A-10. Asterisks are used to denote the significance of the relevant ANOVA or t-test. As shown in Table A-9, perceived knowledge index scores for sample members in both years differed significantly on all of the variables. Examining the patterns of means indicates that the results are generally in the expected direction. Sample members with more education and higher incomes received higher knowledge index scores. Also, higher scores were found for sample members between 65 and 75 years of age, with some institutional utilization, some Part B utilization, private supplemental insurance, or enrollment in managed care. However, the means of the charges variables did not always follow an entirely monotonic pattern, possibly due to the number and range of cut-off points chosen. In some cases, the mean knowledge index scores for respondents with the most charges (e.g., \$5000 or more) were similar or smaller than the mean scores for respondents with fewer

charges (e.g., \$500-\$4,999). However, overall, there does appear to be a general pattern with individuals who have no charges receiving lower knowledge scores than those with any charges.

Table A-10 displays the results for proxy respondents in 1998 and 1999. There were significant differences for all variables, except for managed care in 1998 and 1999 and institutional utilization and private supplemental insurance in 1999. The patterns of means are very similar to those among sample members. Higher knowledge scores were found among respondents with higher education, higher incomes, some Part B utilization, or any charges.

4.2 Three-Item Quiz

This section outlines the results of the item-level and scale-level analyses of the three-item quiz.

4.2.1 Item-Level Analyses

While the perceived knowledge questions ask respondents to rate their own knowledge, the questions on the three-item quiz require respondents to demonstrate their knowledge by determining whether a statement is true or false. Therefore, participants' responses to these questions may be classified as correct or incorrect. To examine the difficulty of the items, we computed the percentage of respondents who answered each item correctly; these results are presented in Table 6.

In both years, the item about flu shots appeared to be the easiest item with 80 to 84 percent of respondents answering it correctly. The item concerning whether supplemental insurance is the same as managed care was the most difficult with the percentage of respondents answering correctly ranging from 36 to 43 percent.

Table 6. Percentage of Correct Responses to the Three-Item Quiz Questions

Question	Sample Member Interviews		Proxy Interviews	
	1998	1999	1998	1999
Medicare covers colorectal cancer screening	48%	50%	45%	46%
Supplemental insurance is the same as managed care	43%	43%	41%	36%
Medicare covers an annual flu shot	84%	84%	82%	80%

To help make the difficulty level of the items more meaningful, we attempted to match a grade level to the items, using information about beneficiaries' educational achievement. We began by classifying sample members in 1999 into the following seven categories based on the highest school grade they completed: (1) no formal education, (2) 8th grade or less, (3) 9th to 12th grade without a high school diploma, (4) high school graduate, (5) some college, (6) bachelor's degree, and (7) graduate degree. Then we calculated the percentage of sample members answering an item correctly, according to their educational achievement. For an item to be matched to a particular grade level, we expected at least 50% of respondents at that grade level (as well as at all higher grade levels) to have answered the item correctly.

Table 7 contains a list of the quiz items, their corresponding grade level, and the number of respondents at that grade level who answered the item correctly. As shown in the table, the quiz question about an annual flu shot was very easy; 71% of beneficiaries with no formal education answered this question correctly. The question concerning supplemental insurance was much more difficult; only 52% of respondents with some college education answered this question correctly.

We also computed a grade level for the overall three-item quiz. To assign a grade level to the quiz, we required that at least 50% of respondents at that grade level answer at least 50% of the quiz items correctly. In other words, respondents must have received an overall quiz score of 2 or 3. The results indicated that the three-item quiz corresponds to a high school level. Fifty-four percent of beneficiaries reporting some high school education received a quiz score of at least 2.

Table 7. Grade Levels and Percentage of Correct Responses at Corresponding Grade Level for Three-Item Quiz Questions

Question	Grade Level	% Correct at Grade Level
Medicare covers colorectal cancer screening	High school graduate	54%
Supplemental insurance is the same as managed care	Some college	52%
Medicare covers an annual flu shot	No formal education	71%

The item–total score correlations for the questions in the three-item quiz are presented in Table 8. A common criterion requires that correlations be greater than 0.30 for the items to be considered as having contributed significantly to the scale. However, only one of the items (colorectal cancer screening) on the three-item quiz consistently met this criterion. In the scale development process, items with low item–total score correlations would usually be removed from the scale; however, given the small number of items on this quiz, it is not feasible to remove any items.

Table 8. Item–Total Score Correlations for the Three-Item Quiz Questions

Question	Sample Member Interviews		Proxy Interviews	
	1998	1999	1998	1999
Medicare covers colorectal cancer screening	0.33	0.31	0.37	0.38
Supplemental insurance is the same as managed care	0.27	0.26	0.31	0.25
Medicare covers an annual flu shot	0.28	0.26	0.28	0.34

4.2.2 Scale-Level Analyses

Several scale-level analyses were conducted on the three-item true/false quiz. Specifically, the distribution of quiz scores was examined, and the reliability and validity of the quiz were evaluated. Because the three-item quiz contains a small number of possible scores, chi-square analyses were used for the validity analyses rather than t-tests and ANOVAs.

Descriptive Statistics

Table 9 shows the distribution of scores on the three-item quiz. The scores reflect good variability. In both years, most respondents answered at least some of the quiz items correctly. Only about 10 percent of sample members and 13 to 14 percent of proxy respondents received the lowest possible score (i.e., a score of 0).

Table 9. Frequency (and Percentage) of Scores on the Three-Item Quiz

Sample Member Interviews (Survey Year)	Score			
	0	1	2	3
1998 (Round 24)	1340 (11%)	3642 (29%)	4387 (35%)	3225 (26%)
1999 (Round 27)	381 (10%)	1032 (28%)	1317 (36%)	965 (26%)
Proxy Interviews (Survey Year)	0	1	2	3
1998 (Round 24)	174 (13%)	435 (32%)	430 (31%)	331 (24%)
1999 (Round 27)	54 (14%)	118 (31%)	125 (33%)	85 (22%)

Reliability

As a measure of internal consistency, Cronbach's alpha was computed for the three quiz items. The coefficient alpha for sample member respondents was 0.46 in 1998 and 0.45 in 1999. Among proxy respondents, coefficient alpha had a value of 0.50 in both 1998 and 1999. Values of Cronbach's alpha above 0.7 are usually considered acceptable. Based on this criterion, these results suggest that the three-item quiz did not reach the acceptable level of internal consistency reliability, possibly due to the small number of items comprising the quiz.

To determine whether the internal consistency of the three-item quiz remains consistent for various populations, the coefficient alphas for the quiz were calculated separately for groups classified according to insurance and service utilization variables. These results are presented in Tables A-11 through A-17 of the appendix. The alphas were fairly similar for most groups. Among proxy respondents in 1999, however, the values for alphas varied widely across the subgroups, particularly on the variables related to charges. For example, the coefficient alpha for those with total reimbursed dollars of \$5,000 or more was 0.32, in comparison to 0.60 for those with total reimbursed dollars of \$1 to \$499. In 1999, the sample contained very few proxy respondents and among those, even fewer individuals may have had the highest level of charges, suggesting that perhaps the alpha coefficients for proxy respondents in 1999 may not provide good estimates of the reliability of the quiz among those with large amounts of charges.

Validity

Chi-square analyses revealed that sample members had significantly different scores on the three-item quiz than did proxy respondents in both 1998 ($\chi^2(3)=13.51$, $p=.004$) and 1999 ($\chi^2(3)=8.67$, $p=.03$). Therefore, the validity analyses are reported separately for these two groups of respondents.

Relationship with Global KANTK Question

For the first set of validity analyses, we conducted chi-square tests to examine the relationship between the three-item quiz and the global KANTK question. The results indicated that scores on the three-item quiz were significantly related to responses to the global KANTK question among sample members during 1998 ($\chi^2(12) = 986.45, p < .0001$) and 1999 ($\chi^2(12) = 302.23, p < .0001$). The same result was found for proxy respondents in 1998 ($\chi^2(12) = 94.51, p < .0001$) and 1999 ($\chi^2(12) = 23.28, p = .025$).

To help interpret the results of these chi-square tests, we computed the frequency and percentage of respondents receiving each quiz score, according to response to the global KANTK question (see Tables 10 and 11). For ease of interpretation, the percentages were calculated separately for each global KANTK response category. For example, as shown in Table 10, 38 percent of respondents who indicated that they knew almost none of what they needed to know on the global KANTK question received a score of 1 on the three-item quiz while only 10 percent of those who gave a response of “almost none” received a quiz score of 3. The pattern of frequencies suggests that higher ratings of knowledge on the global KANTK question were associated with higher scores on the three-item quiz. Generally, a higher percentage of beneficiaries who responded “Most” or “Just about everything” received quiz scores of 2 or 3 compared to beneficiaries who indicated that they knew “A little” or “Almost none” of what they needed to know.

Table 10. Frequency (and Percentage) of Three-Item Quiz Scores by Response to Global KANTK Question among Sample Members

Sample Members – 1998					
3-Item Quiz	Global KANTK Question				
	Almost none	A little	Some	Most	Just about everything
0	427 (22%)	351 (13%)	273 (8%)	164 (5%)	78 (7%)
1	747 (38%)	930 (35%)	1006 (29%)	660 (22%)	256 (22%)
2	579 (30%)	912 (34%)	1294 (37%)	1106 (36%)	438 (37%)
3	204 (10%)	494 (18%)	948 (27%)	1123 (37%)	412 (35%)
Sample Members – 1999					
3-Item Quiz	Global KANTK Question				
	Almost none	A little	Some	Most	Just about everything
0	140 (23%)	99 (13%)	71 (7%)	37 (4%)	24 (8%)
1	214 (35%)	265 (34%)	299 (28%)	173 (20%)	65 (20%)
2	184 (30%)	254 (33%)	410 (39%)	327 (38%)	121 (38%)
3	82 (13%)	152 (20%)	286 (27%)	320 (37%)	110 (34%)

Table 11. Frequency (and Percentage) of Three-Item Quiz Scores by Response to Global KANTK Question among Proxy Respondents

Proxy Respondents - 1998					
3-Item Quiz	Global KANTK Question				
	Almost none	A little	Some	Most	Just about everything
0	47 (22%)	45 (15%)	45 (10%)	20 (7%)	8 (7%)
1	87 (41%)	116 (39%)	127 (29%)	77 (27%)	18 (17%)
2	53 (25%)	83 (28%)	153 (35%)	89 (32%)	42 (39%)
3	24 (11%)	55 (18%)	110 (25%)	95 (34%)	41 (38%)
Proxy Respondents - 1999					
3-Item Quiz	Global KANTK Question				
	Almost none	A little	Some	Most	Just about everything
0	11 (17%)	17 (20%)	9 (8%)	10 (13%)	6 (16%)
1	29 (44%)	28 (33%)	34 (30%)	18 (23%)	6 (16%)
2	18 (27%)	23 (27%)	43 (38%)	25 (33%)	14 (38%)
3	8 (12%)	16 (19%)	26 (23%)	24 (31%)	11 (30%)

Group Comparisons

Next, to evaluate the validity of the three-item quiz, we conducted the known group and exploratory comparisons described in Section 3.2.3. Because the three-item quiz has only four possible scores (i.e., 0 to 3), we used chi-square tests to compare the quiz scores for the various groups; these results are presented separately by interview type in Tables A-18 and A-19. Overall, sample members differed significantly on all of the proposed variables during 1998 and all of the variables except for managed care enrollment during 1999. Examining the distribution of responses revealed that higher quiz scores were obtained by respondents between the ages of 65 and 75 years old, with more education, higher incomes, private supplemental insurance, any institutional or Part B utilization, some total covered charges, total reimbursed dollars, Part B charges, or covered institutional charges. In addition, sample members in 1998 who had been enrolled in managed care during the past year had higher three-item quiz scores.

As shown in Table A-19, proxy respondents differed on most of the proposed variables. The response distributions suggest that higher three-item quiz scores were associated with respondents who had more education, higher incomes, private supplemental insurance, any institutional or Part B utilization, some total covered charges, total reimbursed dollars, Part B charges, or covered institutional charges. In addition, among proxies in 1999, those who had been enrolled in managed care during the past year had higher three-item quiz scores.

4.3 Seven-Item Quiz

4.3.1 Item-Level Analyses

Table 12 displays the percentages of correct responses to the questions that comprise the seven-item quiz. Across both years, the question that asks whether HMOs cover more health services was the most difficult item, with a percentage correct ranging from 35 percent to 40 percent. The question about whether Medicare alone pays for all health care expenses received the highest percentage of correct responses, indicating that it was the easiest item for respondents, possibly because it addresses a particularly relevant topic for beneficiaries.

Table 12. Percentage of Correct Responses to the Seven-Item Quiz Questions

Question	Sample Member Interviews		Proxy Interviews	
	1998	1999	1998	1999
Can select different health plan options	47%	44%	45%	43%
Medicare alone pays for all health care expenses	76%	78%	69%	76%
Medicare offers more information	45%	52%	44%	50%
Can report complaints to Medicare about HMOs and supplemental insurance	58%	56%	56%	56%
Limited choices doctors if on HMOs	63%	61%	59%	54%
Can drop HMO and still be covered by Medicare	47%	46%	43%	39%
HMOs cover more health services	40%	37%	39%	35%

We also conducted grade-level analyses for both the individual quiz items and the overall seven-item quiz. The grade level and corresponding percentage correct for the seven-item quiz questions are presented in Table 13. As shown in the table, the seven-item quiz contains items covering all education levels except for no formal education. The item concerning whether Medicare alone pays for all expenses was easiest with 65% of those having an 8th grade education or less answering it correctly. In contrast, the item about whether HMOs cover more health services was very difficult; only 50% of respondents with a graduate degree answered it correctly.

To assign a grade level to the seven-item quiz, at least 50% of beneficiaries at the grade level must have answered at least 50% of the questions correctly (i.e., received a quiz score of 4 or higher). Similar to the three-item quiz, the seven-item quiz corresponds to a high school level of difficulty. Fifty-one percent of sample members with some high school education received an overall quiz score of 4 or higher.

Table 13. Grade Levels and Percentage of Correct Responses at Corresponding Grade Level for Seven-Item Quiz Questions

Question	Grade Level	% Correct at Grade Level
Can select different health plan options	Bachelor's degree	53%
Medicare alone pays for all health care expenses	8 th grade or less	65%
Medicare offers more information	High school graduate	55%
Can report complaints to Medicare about HMOs and supplemental insurance	Some high school	52%
Limited choices doctors if on HMOs	Some high school	59%
Can drop HMO and still be covered by Medicare	Some college	48%
HMOs cover more health services	Graduate degree	50%

Table 14 shows the item-total score correlations for the questions on the seven-item quiz. All of the items had item-total score correlations over 0.30, suggesting that they are all contributing to the internal consistency reliability of the scale. The four items concerning HMOs had the highest correlations, indicating that they are most related to the underlying construct measured by the scale. Of these four items, the item that asks whether beneficiaries can drop an HMO and still be covered by Medicare had the highest item-total score correlations. Among all seven items on the quiz, the two items about whether Medicare alone pays for all health care expenses and whether Medicare offers more information appeared to be the least related to the underlying construct.

Table 14. Item-Total Score Correlations for the Seven-Item Quiz Questions

Question	Sample Member Interviews		Proxy Interviews	
	1998	1999	1998	1999
Can select different health plan options	0.44	0.40	0.44	0.44
Medicare alone pays for all health care expenses	0.35	0.38	0.38	0.40
Medicare offers more information	0.37	0.37	0.38	0.38
Can report complaints to Medicare about HMOs and supplemental insurance	0.46	0.43	0.52	0.50
Limited choices of doctors if on HMOs	0.52	0.49	0.58	0.52
Can drop HMO and still be covered by Medicare	0.55	0.53	0.60	0.55
HMOs cover more health services	0.49	0.46	0.51	0.49

4.3.2 Scale-Level Analyses

Following the item-level analyses, additional analyses were conducted to explore the psychometric properties of the seven-item quiz as a whole. This section describes the results of these scale-level analyses.

Descriptive Statistics

Table 15 shows the descriptive statistics for the seven-item quiz scores, displayed separately for sample member and proxy respondents. As shown in the table, the distribution of scores was slightly skewed to the right with the mode generally having a higher value than the mean and median. Most respondents received scores of “4” or “5,” indicating that they correctly answered more than half of the questions.

Table 15. Descriptive Statistics for the Seven-Item Quiz

Sample Member Interviews (Survey Year)	N	Mean	S.D.	Median	Mode
1998 (Round 24)	13,062	3.76	2.12	4	5
1999 (Round 27)	3,920	3.74	2.08	4	4
Proxy Interviews (Survey Year)	N	Mean	S.D.	Median	Mode
1998 (Round 24)	1,470	3.56	2.22	4	5
1999 (Round 27)	418	3.54	2.16	4	5

Reliability

The internal consistency reliability of the seven-item quiz was measured using Cronbach’s alpha. The alpha coefficient for the seven-item quiz was 0.74 for sample members in 1998 and 0.73 for sample members in 1999. Among proxy respondents, the alpha coefficient for the quiz was 0.77 in 1998 and 0.75 in 1999. These values indicate that the seven-item quiz reached an acceptable level of reliability.

As mentioned in section 2.0, there was an additional quiz item available in 1998. When this item was included in the calculation of the quiz scores during 1998, the quiz had an alpha of 0.76 for sample members and 0.79 for proxy respondents (Bann et al., 2000). These alpha coefficients are very similar to those found here for the seven-item quiz, suggesting that the removal of this additional item did not have a significant impact on the internal consistency of the quiz.

The alpha coefficients for the seven-item quiz were also calculated separately for various subgroups to assess whether the reliability of the quiz remained consistent. The results are presented in Tables A-20 through A-26 of the appendix. Generally, the values of alpha were very consistent across all of the groups, with alphas ranging from 0.69 to 0.78 for sample members and from 0.71 to 0.79 for proxy respondents.

Validity

To assess construct validity, particular groups who were expected to differ in knowledge were compared to determine if they did in fact receive different scores on the seven-item quiz. (See Tables A-27 and A-28 in the appendix for details of the statistical results.) These analyses were computed separately for sample member and proxy respondents. As hypothesized, sample members received significantly higher scores on the seven-item quiz in 1998 than did proxy respondents

($t(1786) = 3.30, p = .001$). However, the 1999 quiz scores of sample members did not differ significantly from those of proxy respondents ($t(4336) = 1.81, n.s.$).²

Relationship with Global KANTK Question

ANOVAs revealed that the seven-item quiz scores of sample members varied significantly according to responses to the global KANTK question in both 1998 ($F(4, 12972) = 348.68, p < .0001$) and 1999 ($F(4, 3909) = 119.86, p < .0001$). Similar results were found for proxy respondents in 1998 ($F(4, 1455) = 39.70, p < .0001$) and 1999 ($F(4, 411) = 9.37, p < .0001$).

Table 16 displays the means and standard deviations of the seven-item quiz scores by responses to the global KANTK question. For both years and both types of respondents, there is a monotonic relationship between scores on the seven-item quiz and the first four response categories ("Almost none," "A little," "Some," and "Most") for the global KANTK question. Respondents who rated their knowledge higher on the global KANTK question received higher scores on the seven-item quiz. This pattern seems to taper off for the last response category ("Just about everything"). Generally, respondents with ratings of "Most" or "Just about everything" have similar quiz scores. It is possible that respondents do not clearly distinguish between the "Most" and "Just about everything" response categories.

Table 16. Means (and Standard Deviations) of Seven-Item Quiz Scores by Response to Global KANTK Question

Sample Member Interviews (Survey Year)	Almost none	A little	Some	Most	Just about everything
1998 (Round 24)	2.5 (2.1)	3.4 (2.1)	3.9 (2.0)	4.5 (1.9)	4.4 (2.0)
1999 (Round 27)	2.5 (2.0)	3.4 (2.0)	3.9 (1.9)	4.4 (1.8)	4.4 (2.1)
Proxy Interviews (Survey Year)	Almost none	A little	Some	Most	Just about everything
1998 (Round 24)	2.3 (2.2)	3.2 (2.2)	3.8 (2.0)	4.3 (2.0)	4.3 (2.1)
1999 (Round 27)	2.4 (1.8)	3.2 (2.2)	3.9 (2.1)	4.3 (1.9)	3.8 (2.4)

Group Comparisons

ANOVAs and t-tests were conducted to determine whether various subgroups received different scores on the seven-item quiz. The mean seven-item quiz scores for each of the groups are presented separately according to interview type in Tables A-27 and A-28. Asterisks indicate the significance level of the corresponding ANOVA or t-test.

² Please note that for these t-tests the degrees of freedom are smaller for the 1998 sample than the 1999 sample even though it has a larger sample size. The Folded F test for equality of variances indicated that the variances for the proxy and sample members in 1998 could not be assumed to be equal. Therefore, Satterthwaite's approximation was used which usually results in a decrease in the degrees of freedom.

As shown in Table A-27, seven item quiz scores for sample members in 1998 differed significantly on all of the variables except for institutional utilization. The results for sample members in 1999 were significant for all variables except institutional utilization, Part B utilization, and covered institutional charges. The patterns of mean scores for both 1998 and 1999 indicate that the results are generally in the expected direction. Higher quiz scores were associated with sample members who had higher education, higher incomes, some charges, private supplemental insurance, or were between the ages of 65 and 75. In addition, as hypothesized, respondents who had been enrolled in managed care during the past year had higher seven-item quiz scores than those who had not been enrolled during the past year.

Table A-28 displays the results for proxy respondents in 1998 and 1999. There were fewer significant results for proxy respondents than sample members, particularly during 1999. Across both years, higher quiz scores were received by respondents with more education, higher incomes, private supplemental insurance, or who had been enrolled in managed care during the past year. During 1998, higher scores were also found for respondents with some Part B utilization and any allowed Part B charges.

5.0 Conclusions and Recommendations

We developed three potential knowledge measures using data from the Beneficiary Knowledge (BK) and Beneficiary Needs (BN) supplemental rounds of the CY 1998 and 1999 Medicare Current Beneficiary Survey (MCBS). The first measure, the perceived knowledge index, includes five questions that ask beneficiaries to rate how much they know about a particular topic related to Medicare. The other two measures are a three-item and a seven-item quiz that require participants to respond to a series of true/false questions.

We evaluated the psychometric properties of the knowledge measures by calculating item-level and scale-level descriptive statistics, assessing internal consistency reliability, and conducting construct validity analyses. The item-level analyses of the perceived knowledge items suggest that these items appropriately do not exhibit floor or ceiling effects. Comparisons of the 3-item and 7-item quiz scores according to beneficiaries' educational achievement suggest that the difficulty levels of both of these quizzes are equivalent to a high school level.

To assess internal consistency reliability, we computed Cronbach's alphas for each of the measures. A level of 0.70 is commonly required for an alpha to be considered acceptable for use in group-level analyses. As shown in Table 17, both the seven-item quiz and the perceived knowledge index met this criterion. The seven-item quiz had coefficient alphas of 0.73 to 0.77, while the perceived knowledge index demonstrated strong internal consistency reliability with alphas ranging from 0.82 to 0.85. With Cronbach's alphas ranging from 0.45 to 0.50, the three-item quiz did not meet the acceptability criterion. These low coefficient alphas may be due to the small number of items on the quiz, suggesting that the internal consistency reliability of the three-item quiz could be increased by adding items.

Table 17. Coefficient Alphas of the Knowledge Indices

Sample Member Interviews (Survey Year)	Perceived Knowledge Index	3-Item Quiz	7-Item Quiz
1998 (Round 24)	.82	.46	.74
1999 (Round 27)	.82	.45	.73
Proxy Interviews (Survey Year)			
1998 (Round 24)	.84	.50	.77
1999 (Round 27)	.85	.50	.75

To evaluate the construct validity of the knowledge indices, we examined the relationship between each index and a global knowledge item that asks respondents how much they feel they know about the Medicare program, referred to as the global know-all-need-to-know (KANTK) question. A strong relationship between a knowledge index and another measure of the same construct (e.g., the global KANTK question) would provide support for the construct validity of the knowledge index. The results indicated that all three knowledge indices are significantly related to the global KANTK question. Respondents who rated their knowledge higher on the global KANTK question received higher scores on each knowledge index. In particular, there appeared to be a strong, monotonic relationship between the perceived knowledge index and the global KANTK question, possibly because of the similarity in wording between the two. Nonetheless we can infer that they closely measure the same construct.

As a further evaluation of the validity of the knowledge indices, we analyzed comparisons of the mean knowledge index scores for various groups. The first set of analyses, sometimes referred to as known-groups comparisons, involve comparisons between groups previously shown to have different knowledge levels. We also compared groups we hypothesized would differ in knowledge which we referred to as exploratory comparisons.

All three knowledge indices performed well on the known group comparisons. In general, groups that were expected to differ in knowledge had significantly different knowledge index scores. Because of the small number of proxy respondents in 1999, however, the knowledge index scores for this group had much lower statistical power and the differences were therefore less likely to be significant.

One of the most consistent findings across all years and interview types was a strong relationship between higher educational achievement and higher knowledge scores. As mentioned in Chapter 3, this relationship has been found repeatedly in prior research. Possible explanations include those with more education having better comprehension of the program materials or a greater motivation to learn about the Medicare program. Another finding was that, as hypothesized, the relationship between knowledge scores and enrollment in managed care was strongest for the seven-item quiz. This quiz includes four questions concerning managed care plans, while the three-item quiz and the perceived knowledge index each contain only one question on this topic.

Based solely on the quantitative results, the perceived knowledge index seems to have the best psychometric properties. This index performed well in both the reliability and validity analyses. However, other criteria, such as the content of the items, must be considered when selecting the most appropriate measure of knowledge. The perceived knowledge index relies on beneficiaries to be the sole judge of their knowledge. Individuals' subjective ratings of their own knowledge may be influenced by factors other than knowledge, such as confidence in decision-making or satisfaction with information received. Therefore, the perceived knowledge index may not provide the most accurate assessment of actual knowledge level. A more precise measure of knowledge would require respondents to demonstrate their knowledge, such as by correctly answering the true/false questions included on the three-item and seven-item quizzes.

On the basis of both content considerations and the psychometric analysis results, the seven-item quiz appears to be the most useful measure of beneficiary knowledge overall. As mentioned above, the quiz requires beneficiaries to demonstrate their knowledge rather than merely stating that they know everything they need to know. In addition, the quiz had good variability in scores, reached an acceptable level of internal consistency reliability, and performed well on the validity analyses.

Possible modifications to the seven-item quiz depend on the intended use of the measure. If the goal of the quiz is to obtain the most precise estimate of beneficiaries' knowledge possible, then the quiz should contain questions that cover all difficulty levels. The grade-level analyses suggest that the items on the seven-item quiz cover all education levels except for no formal education. Very few respondents report having no formal education and therefore it may not be necessary to add questions specifically targeted at this group. However, the quiz contains only one item at the high school graduate level. Because more respondents report being a high school graduate than any other educational level, it may be helpful to add more items targeted at this group.

In contrast, if the purpose of the quiz is to determine whether Medicare beneficiaries reach a certain proficiency level, then the primary emphasis should be on the content of the quiz items. The items should cover the entire range of information that beneficiaries need to know in order to make informed decisions. Less emphasis should be placed on the difficulty of the items. In this case, a limitation of the seven-item quiz is that four of its seven questions deal with managed care plans which restricts the range of knowledge that the quiz can measure. Other questions could be added to improve the comprehensiveness of the quiz. In fact, as part of RTI's *Questionnaire Development and Cognitive Testing Using Item Response Theory* project, several new knowledge questions were developed that address a variety of issues, including beneficiary rights and health plan decision-making (Uhrig et al., 2001), and could be used to expand the seven-item quiz.

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Appendix

Tables of Results from Psychometric Analyses

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Table A-1. MCBS Knowledge Questions

Question Wording	Round	Year
Perceived Knowledge Index	24, 27	1998, 1999
BN 1: How much do you feel you know about what medical services Medicare covers or does not cover? Do you know just about everything you need to know, most of what you need to know, some of what you need to know, a little of what you need to know, or almost none of what you need to know about what Medicare covers or doesn't cover?		
BN 2: How much do you feel you know about how much you have to pay for medical services? Do you know just about everything you need to know, most of what you need to know, some of what you need to know, a little of what you need to know, or almost none of what you need to know about how much you have to pay for medical services?		
BN 3: How much do you feel you know about supplemental or Medigap insurance, such as what it covers or how it works with Medicare to pay medical claims? Do you know just about everything you need to know, most of what you need to know, some of what you need to know, a little of what you need to know, or almost none of what you need to know about supplemental insurance?		
BN 4: How much do you feel you know about the availability and benefits of Medicare managed care plans? Do you know just about everything you need to know, most of what you need to know, some of what you need to know, a little of what you need to know, or almost none of what you need to know about the availability and benefits of managed care plans?		
BN 5: How much do you feel you know about choosing or finding a doctor or other health care provider? Do you know just about everything you need to know, most of what you need to know, some of what you need to know, a little of what you need to know, or almost none of what you need to know about finding a doctor or other health care provider?		
Three-Item Quiz^{1,2}	24, 27	1998, 1999
BN 16: Medicare covers colorectal cancer screening. <i>(True)</i>		
BN 18: Medigap or supplemental insurance is the same as a Medicare managed care plan. <i>(False)</i>		
BN 19: Medicare covers an annual flu shot. <i>(True)</i>		

Source: Medicare Current Beneficiary Survey Supplemental Rounds BN 24 and 27.

Table A-1 (continued)

Question Wording	Round	Year
Seven-Item Quiz^{1,2}	23, 26	1998, 1999
BK 43: Most people covered by Medicare can select among different kinds of health plan options within Medicare. (<i>True</i>)		
BK 44: Medicare without a supplemental insurance policy pays for all of your health care expenses. (<i>False</i>)		
BK 46: The Medicare program has begun to offer more information and help in order to answer your Medicare questions. (<i>True</i>)		
BK 47: People can report complaints to Medicare about their Medicare managed care plans (HMOs) or supplemental plans if they are not satisfied with them. (<i>True</i>)		
BK 48: If someone joins a Medicare managed care plan (HMO) that covers people on Medicare, they have limited choices about which doctors they can see. (<i>True</i>)		
BK 49: If someone joins a Medicare managed care plan (HMO) that covers people on Medicare, they can change or drop the plan and still be covered by Medicare. (<i>True</i>)		
BK 50: Medicare managed care plans (HMOs) that cover people on Medicare often cover more health services, like prescribed medicines, than Medicare without a supplemental policy. (<i>True</i>)		

Source: Medicare Current Beneficiary Survey Supplemental Rounds BK 23 and 26

¹ The correct answers to the quiz questions are presented in italics following each question.

² For each of the quizzes, only one of the questions has a correct answer of false. Because there is a possibility of a response set bias, it is often preferable to vary the correct responses to the questions on a quiz rather than having the same correct response for almost all of the questions.

Table A-2. Coefficient Alphas of the Perceived Knowledge Index, by Enrollment in Managed Care During the Past Year

Interview Type/Survey Year	No Enrollment	Some Enrollment
Sample Member Interviews		
1998 (Round 24)	0.82	0.83
1999 (Round 27)	0.83	0.84
Proxy Interviews		
1998 (Round 24)	0.84	0.85
1999 (Round 27)	0.85	0.87

SOURCE: Centers for Medicare & Medicaid Services, Medicare Current Beneficiary Survey 1998 and 1999 Access to Care and Supplemental Files.

Table A-3. Coefficient Alphas of the Perceived Knowledge Index, by Institutional Utilization¹

Interview Type/Survey Year	No Utilization	Some Utilization
Sample Member Interviews		
1998 (Round 24)	0.83	0.82
1999 (Round 27)	0.83	0.82
Proxy Interviews		
1998 (Round 24)	0.86	0.83
1999 (Round 27)	0.87	0.84

¹Only respondents who were not enrolled in managed care during the past year were included in these analyses.

Table A-4. Coefficient Alphas of the Perceived Knowledge Index, by Part B Utilization¹

Interview Type/Survey Year	No Utilization	Some Utilization
Sample Member Interviews		
1998 (Round 24)	0.83	0.82
1999 (Round 27)	0.83	0.82
Proxy Interviews		
1998 (Round 24)	0.87	0.84
1999 (Round 27)	0.87	0.85

¹Only respondents who were not enrolled in managed care during the past year were included in these analyses.

Table A-5. Coefficient Alphas of the Perceived Knowledge Index, by Total Covered Charges¹

Interview Type/Survey Year	\$0	\$1 - \$499	\$500 - \$4,999	\$5,000 or More
Sample Member Interviews				
1998 (Round 24)	0.83	0.82	0.82	0.83
1999 (Round 27)	0.83	0.82	0.82	0.83
Proxy Interviews				
1998 (Round 24)	0.87	0.84	0.84	0.82
1999 (Round 27)	0.86	0.86	0.85	0.83

¹ Only respondents who were not enrolled in managed care during the past year were included in these analyses.

Table A-6. Coefficient Alphas of the Perceived Knowledge Index, by Total Reimbursed Dollars¹

Interview Type/Survey Year	\$0	\$1 - \$499	\$500 - \$4,999	\$5,000 or More
Sample Member Interviews				
1998 (Round 24)	0.83	0.82	0.82	0.83
1999 (Round 27)	0.83	0.82	0.82	0.83
Proxy Interviews				
1998 (Round 24)	0.86	0.85	0.83	0.82
1999 (Round 27)	0.87	0.86	0.84	0.83

¹ Only respondents who were not enrolled in managed care during the past year were included in these analyses.

Table A-7. Coefficient Alphas of the Perceived Knowledge Index, by Covered Institutional Charges¹

Interview Type/Survey Year	\$0	\$1 - \$499	\$500 - \$4,999	\$5,000 or More
Sample Member Interviews				
1998 (Round 24)	0.83	0.82	0.82	0.83
1999 (Round 27)	0.83	0.81	0.83	0.83
Proxy Interviews				
1998 (Round 24)	0.86	0.83	0.84	0.81
1999 (Round 27)	0.87	0.85	0.84	0.82

¹ Only respondents who were not enrolled in managed care during the past year were included in these analyses.

Table A-8. Coefficient Alphas of the Perceived Knowledge Index, by Allowed Part B Charges¹

Interview Type/Survey Year	\$0	\$1 - \$499	\$500 - \$1,499	\$1,500 or More
Sample Member Interviews				
1998 (Round 24)	0.83	0.83	0.82	0.82
1999 (Round 27)	0.83	0.83	0.82	0.82
Proxy Interviews				
1998 (Round 24)	0.87	0.83	0.84	0.83
1999 (Round 27)	0.87	0.86	0.84	0.83

¹ Only respondents who were not enrolled in managed care during the past year were included in these analyses.

Table A-9. Mean Perceived Knowledge Index Scores and Statistical Significance of ANOVAs and t-Tests among Sample Members

Variable	Sample Members 1998	Sample Members 1999
Education		
8 th grade or less	12.92***	13.06***
More than 8 th grade, but no college	15.28	15.54
College	16.59	17.19
Age category		
65-75	15.84***	16.31***
Over 75	15.07	15.54
Income category		
Under \$25,000	14.50***	14.84***
\$25,000 or more	16.86	17.24
Managed care		
Some enrollment	16.37***	16.71***
No enrollment	14.95	15.38
Private Supplemental Insurance		
Supplemental insurance	16.03***	16.25***
No supplemental insurance	14.62	14.75
Any institutional utilization ¹		
Some utilization	15.07***	15.61***
No utilization	14.72	14.90
Any Part B utilization ¹		
Some utilization	15.17***	15.58***
No utilization	13.28	13.63
Total covered charges ¹		
\$0	13.89***	13.69***
\$1-\$499	14.70	15.06
\$500-\$4,999	15.38	15.76
\$5,000 or more	15.12	15.62
Total reimbursed dollars ¹		
\$0	11.95***	13.84***
\$1-\$499	13.52	15.34
\$500-\$4,999	14.97	15.86
\$5,000 or more	15.43	15.38
Covered institutional charges ¹		
\$0	14.72***	14.90***
\$1-\$499	15.05	15.72
\$500-\$4,999	15.11	15.61
\$5,000 or more	15.04	15.50
Allowed Part B charges ¹		
\$0	13.34***	13.77***
\$1-\$499	14.75	15.06
\$500-\$1,499	15.37	15.84
\$1,500 or more	15.44	15.81

¹ Only respondents who were not enrolled in managed care during the past year were included in these analyses.

* p < .05, ** p < .01, *** p < .001

Table A-10. Mean Perceived Knowledge Index Scores and Statistical Significance of ANOVAs and t-Tests among Proxy Respondents

Variable	Proxy Respondents 1998	Proxy Respondents 1999
Education		
8 th grade or less	13.88***	14.36***
More than 8 th grade, but no college	15.22	15.36
College	16.17	16.37
Age category		
65-75	15.38	15.90
Over 75	15.09	15.48
Income category		
Under \$25,000	14.28***	14.63***
\$25,000 or more	16.85	17.13
Managed care		
Some enrollment	15.42	15.52
No enrollment	14.70	15.09
Private Supplemental Insurance		
Supplemental insurance	15.99***	15.64
No supplemental insurance	14.27	14.23
Any institutional utilization¹		
Some utilization	14.98*	15.30
No utilization	14.24	14.70
Any Part B utilization¹		
Some utilization	14.97***	15.32***
No utilization	13.25	13.72
Total covered charges¹		
\$0	13.60***	13.83**
\$1-\$499	14.31	14.86
\$500-\$4,999	15.10	15.19
\$5,000 or more	15.02	15.68
Total reimbursed dollars¹		
\$0	13.55***	13.93**
\$1-\$499	14.55	14.88
\$500-\$4,999	15.24	15.35
\$5,000 or more	14.91	15.82
Covered institutional charges¹		
\$0	14.23*	14.70*
\$1-\$499	14.90	14.90
\$500-\$4,999	15.36	14.96
\$5,000 or more	14.67	15.91
Allowed Part B charges¹		
\$0	13.45***	13.62***
\$1-\$499	14.74	14.85
\$500-\$1,499	14.83	15.29
\$1,500 or more	15.22	15.88

¹ Only respondents who were not enrolled in managed care during the past year were included in these analyses.

* p < .05, ** p < .01, *** p < .001

Table A-11. Coefficient Alphas of the Three-Item Quiz, by Enrollment in Managed Care During the Past Year

Interview Type/Survey Year	No Enrollment	Some Enrollment
Sample Member Interviews		
1998 (Round 24)	0.47	0.41
1999 (Round 27)	0.46	0.40
Proxy Interviews		
1998 (Round 24)	0.51	0.43
1999 (Round 27)	0.52	0.38

Table A-12. Coefficient Alphas of the Three-Item Quiz, by Institutional Utilization¹

Interview Type/Survey Year	No Utilization	Some Utilization
Sample Member Interviews		
1998 (Round 24)	0.50	0.45
1999 (Round 27)	0.48	0.44
Proxy Interviews		
1998 (Round 24)	0.53	0.48
1999 (Round 27)	0.54	0.49

¹ Only respondents who were not enrolled in managed care during the past year were included in these analyses.

Table A-13. Coefficient Alphas of the Three-Item Quiz, by Part B Utilization¹

Interview Type/Survey Year	No Utilization	Some Utilization
Sample Member Interviews		
1998 (Round 24)	0.52	0.45
1999 (Round 27)	0.53	0.44
Proxy Interviews		
1998 (Round 24)	0.53	0.50
1999 (Round 27)	0.52	0.50

¹ Only respondents who were not enrolled in managed care during the past year were included in these analyses.

Table A-14. Coefficient Alphas of the Three-Item Quiz, by Total Covered Charges¹

Interview Type/Survey Year	\$0	\$1 - \$499	\$500 - \$4,999	\$5,000 or More
Sample Member Interviews				
1998 (Round 24)	0.52	0.47	0.43	0.47
1999 (Round 27)	0.56	0.38	0.46	0.44
Proxy Interviews				
1998 (Round 24)	0.54	0.52	0.53	0.43
1999 (Round 27)	0.51	0.61	0.52	0.38

¹ Only respondents who were not enrolled in managed care during the past year were included in these analyses.

Table A-15. Coefficient Alphas of the Three-Item Quiz, by Total Reimbursed Dollars¹

Interview Type/Survey Year	\$0	\$1 - \$499	\$500 - \$4,999	\$5,000 or More
Sample Member Interviews				
1998 (Round 24)	0.51	0.45	0.44	0.46
1999 (Round 27)	0.52	0.43	0.44	0.43
Proxy Interviews				
1998 (Round 24)	0.51	0.56	0.47	0.48
1999 (Round 27)	0.46	0.60	0.53	0.32

¹ Only respondents who were not enrolled in managed care during the past year were included in these analyses.

Table A-16. Coefficient Alphas of the Three-Item Quiz, by Covered Institutional Charges¹

Interview Type/Survey Year	\$0	\$1 - \$499	\$500 - \$4,999	\$5,000 or More
Sample Member Interviews				
1998 (Round 24)	0.50	0.43	0.46	0.47
1999 (Round 27)	0.48	0.40	0.46	0.45
Proxy Interviews				
1998 (Round 24)	0.56	0.47	0.48	0.47
1999 (Round 27)	0.54	0.58	0.56	0.36

¹ Only respondents who were not enrolled in managed care during the past year were included in these analyses.

Table A-17. Coefficient Alphas of the Three-Item Quiz, by Allowed Part B Charges¹

Interview Type/Survey Year	\$0	\$1 - \$499	\$500 - \$1,499	\$1,500 or More
Sample Member Interviews				
1998 (Round 24)	0.53	0.46	0.41	0.46
1999 (Round 27)	0.55	0.43	0.43	0.44
Proxy Interviews				
1998 (Round 24)	0.51	0.53	0.47	0.48
1999 (Round 27)	0.53	0.54	0.56	0.36

¹ Only respondents who were not enrolled in managed care during the past year were included in these analyses.

Table A-18. Results from Statistical Analysis of Three-Item Quiz among Sample Members

Variable	Chi-Square Value	Degrees of Freedom	P-Value
Sample Member Interviews – 1998			
Education	575.82	6	.001
Age category	93.09	3	< .001
Income category	418.82	3	.001
Managed care	37.94	3	.001
Private supplemental insurance	214.15	3	< .001
Any institutional utilization [†]	110.31	3	.001
Any Part B claim [†]	355.89	3	.001
Total covered charges [†]	381.88	9	.001
Total reimbursed dollars [†]	391.32	9	.001
Covered institutional charges [†]	118.90	9	.001
Allowed Part B charges [†]	402.02	9	.001
Sample Member Interviews – 1999			
Education	179.65	6	< .001
Age category	31.44	3	< .001
Income category	159.57	3	< .001
Managed care	6.06	3	n.s.
Private supplemental insurance	19.04	3	< .001
Any institutional utilization [†]	43.97	3	< .001
Any Part B claim [†]	66.41	3	< .001
Total covered charges [†]	94.23	9	< .001
Total reimbursed dollars [†]	102.69	9	< .001
Covered institutional charges [†]	46.42	9	< .001
Allowed Part B charges [†]	88.13	9	< .001

[†] Only respondents who were not enrolled in managed care during the past year were included in these analyses.

Table A-19. Results from Statistical Analysis of Three-Item Quiz among Proxy Respondents

Variable	Chi-Square Value	Degrees of Freedom	P-Value
Proxy Interviews – 1998			
Education	37.21	6	.001
Age category	3.51	3	n.s.
Income category	67.49	3	.001
Managed care	2.89	3	n.s.
Private supplemental insurance	37.63	3	< .001
Any institutional utilization ¹	15.27	3	.002
Any Part B claim ¹	21.98	3	.001
Total covered charges ¹	32.03	9	.001
Total reimbursed dollars ¹	32.08	9	.001
Covered institutional charges ¹	26.01	9	.002
Allowed Part B charges ¹	34.14	9	.001
Proxy Interviews – 1999			
Education	12.30	6	.056
Age category	3.98	3	n.s.
Income category	19.93	3	< .001
Managed care	5.46	3	n.s.
Private supplemental insurance	11.74	3	.008
Any institutional utilization ¹	6.28	3	n.s.
Any Part B claim ¹	12.15	3	.007
Total covered charges ¹	18.59	9	.029
Total reimbursed dollars ¹	22.32	9	.008
Covered institutional charges ¹	10.41	9	n.s.
Allowed Part B charges ¹	23.47	9	.005

¹ Only respondents who were not enrolled in managed care during the past year were included in these analyses.

Table A-20. Coefficient Alphas of the Seven-Item Quiz, by Enrollment in Managed Care During the Past Year

Interview Type/Survey Year	No Enrollment	Some Enrollment
Sample Member Interviews		
1998 (Round 24)	0.74	0.69
1999 (Round 27)	0.72	0.70
Proxy Interviews		
1998 (Round 24)	0.77	0.76
1999 (Round 27)	0.75	0.71

Table A-21. Coefficient Alphas of the Seven-Item Quiz, by Institutional Utilization¹

Interview Type/Survey Year	No Utilization	Some Utilization
Sample Member Interviews		
1998 (Round 24)	0.75	0.74
1999 (Round 27)	0.74	0.71
Proxy Interviews		
1998 (Round 24)	0.77	0.76
1999 (Round 27)	0.75	0.75

¹ Only respondents who were not enrolled in managed care during the past year were included in these analyses.

Table A-22. Coefficient Alphas of the Seven-Item Quiz, by Part B Utilization¹

Interview Type/Survey Year	No Utilization	Some Utilization
Sample Member Interviews		
1998 (Round 24)	0.78	0.73
1999 (Round 27)	0.76	0.72
Proxy Interviews		
1998 (Round 24)	0.79	0.76
1999 (Round 27)	0.75	0.75

¹ Only respondents who were not enrolled in managed care during the past year were included in these analyses.

Table A-23. Coefficient Alphas of the Seven-Item Quiz, by Total Covered Charges¹

Interview Type/Survey Year	\$0	\$1 - \$499	\$500 - \$4,999	\$5,000 or More
Sample Member Interviews				
1998 (Round 24)	0.78	0.73	0.73	0.74
1999 (Round 27)	0.77	0.71	0.72	0.72
Proxy Interviews				
1998 (Round 24)	0.78	0.73	0.77	0.77
1999 (Round 27)	0.76	0.73	0.74	0.77

¹ Only respondents who were not enrolled in managed care during the past year were included in these analyses.

Table A-24. Coefficient Alphas of the Seven-Item Quiz, by Total Reimbursed Dollars¹

Interview Type/Survey Year	\$0	\$1 - \$499	\$500 - \$4,999	\$5,000 or More
Sample Member Interviews				
1998 (Round 24)	0.78	0.73	0.73	0.75
1999 (Round 27)	0.75	0.71	0.71	0.73
Proxy Interviews				
1998 (Round 24)	0.78	0.74	0.78	0.77
1999 (Round 27)	0.74	0.74	0.75	0.78

¹ Only respondents who were not enrolled in managed care during the past year were included in these analyses.

Table A-25. Coefficient Alphas of the Seven-Item Quiz, by Covered Institutional Charges¹

Interview Type/Survey Year	\$0	\$1 - \$499	\$500 - \$4,999	\$5,000 or More
Sample Member Interviews				
1998 (Round 24)	0.75	0.73	0.73	0.74
1999 (Round 27)	0.74	0.71	0.70	0.72
Proxy Interviews				
1998 (Round 24)	0.77	0.75	0.76	0.77
1999 (Round 27)	0.75	0.76	0.74	0.75

¹ Only respondents who were not enrolled in managed care during the past year were included in these analyses.

Table A-26. Coefficient Alphas of the Seven-Item Quiz, by Allowed Part B Charges¹

Interview Type/Survey Year	\$0	\$1 - \$499	\$500 - \$1,499	\$1,500 or More
Sample Member Interviews				
1998 (Round 24)	0.78	0.73	0.73	0.74
1999 (Round 27)	0.76	0.71	0.71	0.73
Proxy Interviews				
1998 (Round 24)	0.78	0.74	0.77	0.77
1999 (Round 27)	0.77	0.74	0.73	0.76

¹ Only respondents who were not enrolled in managed care during the past year were included in these analyses.

Table A-27. Mean Seven-Item Quiz Scores and Statistical Significance of ANOVAS and t-tests among Sample Members

Variable	Sample Members 1998	Sample Members 1999
Education		
8 th grade or less	2.86***	2.67***
More than 8 th grade, but no college	3.76	3.75
College	4.34	4.26
Age category		
65-75	4.10***	4.10***
Over 75	3.58	3.50
Income category		
Under \$25,000	3.48***	3.42***
\$25,000 or more	4.40	4.32
Managed care		
Some enrollment	4.67***	4.61***
No enrollment	3.55	3.52
Private Supplemental Insurance		
Enrolled	4.16***	4.11***
Not enrolled	3.47	3.37
Any institutional utilization ¹		
Some utilization	3.54	3.54
No utilization	3.58	3.47
Any Part B utilization ¹		
Some utilization	3.61***	3.54
No utilization	3.13	3.35
Total covered charges ¹		
\$0	3.19***	3.26*
\$1-\$499	3.54	3.56
\$500-\$4,999	3.70	3.62
\$5,000 or more	3.53	3.43
Covered institutional charges ¹		
\$0	3.58**	3.48
\$1-\$499	3.64	3.67
\$500-\$4,999	3.55	3.53
\$5,000 or more	3.43	3.42
Allowed Part B charges ¹		
\$0	3.17***	3.29*
\$1-\$499	3.51	3.49
\$500-\$1,499	3.72	3.65
\$1,500 or more	3.60	3.52

¹ Only respondents who were not enrolled in managed care during the past year were included in these analyses.

* p < .05, ** p < .01, *** p < .001

Table A-28. Mean Seven-Item Quiz Scores and Statistical Significance of ANOVAS and t-tests among Proxy Respondents

Variable	Proxy Respondents 1998	Proxy Respondents 1999
Education		
8 th grade or less	3.08***	3.20**
More than 8 th grade, but no college	3.84	3.63
College	4.11	4.34
Age category		
65-75	3.64	4.10
Over 75	3.64	3.51
Income category		
Under \$25,000	3.33***	3.29***
\$25,000 or more	4.48	4.64
Managed care		
Some enrollment	4.38***	4.52***
No enrollment	3.44	3.36
Private Supplemental Insurance		
Enrolled	4.20***	4.39**
Not enrolled	3.27	3.40
Any institutional utilization ¹		
Some utilization	3.36	3.40
No utilization	3.49	3.30
Any Part B utilization ¹		
Some utilization	3.52**	3.44
No utilization	3.03	2.95
Total covered charges ¹		
\$0	3.13	3.00
\$1-\$499	3.28	3.17
\$500-\$4,999	3.58	3.37
\$5,000 or more	3.53	3.64
Covered institutional charges ¹		
\$0	3.37	3.30
\$1-\$499	3.29	3.17
\$500-\$4,999	3.56	3.25
\$5,000 or more	3.54	3.66
Allowed Part B charges ¹		
\$0	3.05**	2.86
\$1-\$499	3.34	3.33
\$500-\$1,499	3.71	3.48
\$1,500 or more	3.53	3.57

¹ Only respondents who were not enrolled in managed care during the past year were included in these analyses.

* p < .05, ** p < .01, *** p < .001

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